



#6

SEQUENCE LISTING

<110> Chern, Maw Shenq
 Ronald, Pamela
 The Regents of the University of California

<120> Proteins That Regulate Systemic Acquired Resistance in
 Plants

<130> 023070-094800US

<140> US 09/294,539

<141> 1999-04-19

<160> 26

<170> PatentIn Ver. 2.1

<210> 1

<211> 700

<212> DNA

<213> Oryza sativa

<220>

<221> CDS

<222> (1)..(393)

<223> proline-rich NPR1 interactor (PNI)

<400> 1

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| atg | gac | gcc | acc | acc | acg | gac | gcc | acc | acc | gcc | aag | cgc | aag | cgc | cca | 48 |
| Met | Asp | Ala | Thr | Thr | Thr | Asp | Ala | Thr | Thr | Ala | Lys | Arg | Lys | Arg | Pro | |
| 1 | | | | 5 | | | | | 10 | | | | | 15 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
| gcc | gcc | tcc | gac | atc | gcc | gac | gac | gcc | ccc | acc | acc | gtc | gac | gag | gtc | 96 |
| Ala | Ala | Ser | Asp | Ile | Ala | Asp | Asp | Ala | Pro | Thr | Thr | Val | Asp | Glu | Val | |
| | | 20 | | | | | 25 | | | | | 30 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| tcc | gac | gcc | gag | gtc | gag | gag | ttc | tac | gcc | atc | ctc | cgc | cgc | atg | cgc | 144 |
| Ser | Asp | Ala | Glu | Val | Glu | Glu | Phe | Tyr | Ala | Ile | Leu | Arg | Arg | Met | Arg | |
| | | 35 | | | | | 40 | | | | | 45 | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gac | gcc | acc | cga | cgg | ctc | ggc | gcc | cgc | cct | ccc | ccg | ccg | cgc | gcg | ccg | 192 |
| Asp | Ala | Thr | Arg | Arg | Leu | Gly | Ala | Arg | Pro | Pro | Pro | Pro | Arg | Ala | Pro | |
| | | 50 | | | | 55 | | | | | 60 | | | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gcg | tgg | cgc | ccc | agc | ttc | tcc | tgg | gag | gac | ttc | gcc | gac | gcg | ccg | ccc | 240 |
| Ala | Trp | Arg | Pro | Ser | Phe | Ser | Trp | Glu | Asp | Phe | Ala | Asp | Ala | Pro | Pro | |
| 65 | | | | | 70 | | | | 75 | | | | | 80 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aag | cag | gcg | ccg | ccg | ccg | ccg | cag | cag | ccc | gcc | gac | cac | gag | cgc | gtc | 288 |
| Lys | Gln | Ala | Pro | Pro | Pro | Pro | Gln | Gln | Pro | Ala | Asp | His | Glu | Arg | Val | |
| | | | 85 | | | | | | 90 | | | | | 95 | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| gcc | gag | aac | gcc | acc | ccg | ccc | cgg | cgc | ccg | gcg | ccc | ggc | ctc | gac | ctg | 336 |
| Ala | Glu | Asn | Ala | Thr | Pro | Pro | Arg | Arg | Pro | Ala | Pro | Gly | Leu | Asp | Leu | |
| | | | 100 | | | | 105 | | | | | | 110 | | | |

| | | | | | | | | | | | | | | | | |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| aac | gtc | gag | ccg | ccg | tcc | gac | gcg | ccg | gcc | acg | ccg | cgc | tcg | gcg | cgc | 384 |
| Asn | Val | Glu | Pro | Pro | Ser | Asp | Ala | Pro | Ala | Thr | Pro | Arg | Ser | Ala | Arg | |
| | | 115 | | | | | 120 | | | | | 125 | | | | |

gcc ccg gca taggcgcgcg ccacgaggaa acgcggcgcg tcgcgcatgc 433
 Ala Pro Ala
 130

gggtgctcac ggattacaac tacttttgcta gctagaagca gctagctgca gtgttggtgatt 493
 gatccatcca tggagctgcc ttgtcctcct tgtgtgtgaa caggtgagac ctggttaatc 553
 aatcgctcctt gctgggaaga aacaatccat tattgggtccc atcatggaga tgtactatca 613
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 <213> Oryza sativa

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 Ser Asp Ala Glu Val Glu Glu Phe Tyr Ala Ile Leu Arg Arg Met Arg
 35 40 45
 Asp Ala Thr Arg Arg Leu Gly Ala Arg Pro Pro Pro Pro Arg Ala Pro
 50 55 60
 Ala Trp Arg Pro Ser Phe Ser Trp Glu Asp Phe Ala Asp Ala Pro Pro
 65 70 75 80
 Lys Gln Ala Pro Pro Pro Pro Gln Gln Pro Ala Asp His Glu Arg Val
 85 90 95
 Ala Glu Asn Ala Thr Pro Pro Arg Arg Pro Ala Pro Gly Leu Asp Leu
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 Ala Pro Ala
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 <223> NPR1 homologue 1 (NH1) protein that interacts with
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<400> 3

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| Met Glu Pro Pro Thr Ser His Val Thr Asn Ala Phe Ser Asp Ser Asp | |
| 1 5 10 15 | |
| agc gcg tcc gtg gag gag ggg gac gcc gac gcg gac gcc gac gtg gag | 96 |
| Ser Ala Ser Val Glu Glu Gly Asp Ala Asp Ala Asp Ala Asp Val Glu | |
| 20 25 30 | |
| gcg ctc cgc cgc ctc tcc gac aac ctc gcc gcg gcg ttc cgc tcg ccc | 144 |
| Ala Leu Arg Arg Leu Ser Asp Asn Leu Ala Ala Ala Phe Arg Ser Pro | |
| 35 40 45 | |
| gag gac ttc gcg ttc ctc gcc gac gcg cgc atc gcc gtc ccg ggc ggc | 192 |
| Glu Asp Phe Ala Phe Leu Ala Asp Ala Arg Ile Ala Val Pro Gly Gly | |
| 50 55 60 | |
| ggc ggc ggc ggc ggc gac ctg cgg gtg cac cgc tgc gtg ctc tcc gcg | 240 |
| Gly Gly Gly Gly Gly Asp Leu Arg Val His Arg Cys Val Leu Ser Ala | |
| 65 70 75 80 | |
| cgg agc ccc ttc ctg cgc ggc gtc ttc gcg cgc cgc gcc gcc gcc gcc | 288 |
| Arg Ser Pro Phe Leu Arg Gly Val Phe Ala Arg Arg Ala Ala Ala Ala | |
| 85 90 95 | |
| gca ggc ggc ggc ggc gag gat ggc agc gag agg ctg gag ctc cgg gag | 336 |
| Ala Gly Gly Gly Gly Glu Asp Gly Ser Glu Arg Leu Glu Leu Arg Glu | |
| 100 105 110 | |
| ctc ctc ggc ggc ggc ggc gag gag gtg gag gtc ggg tac gag gcg ctg | 384 |
| Leu Leu Gly Gly Gly Gly Glu Glu Val Glu Val Gly Tyr Glu Ala Leu | |
| 115 120 125 | |
| cgg ctg gtg ctc gac tac ctc tac agc ggc cgc gtc ggc gac ctg ccc | 432 |
| Arg Leu Val Leu Asp Tyr Leu Tyr Ser Gly Arg Val Gly Asp Leu Pro | |
| 130 135 140 | |
| aag gcg gcg tgc ctc tgc gtc gac gag gac tgc gcc cac gtc ggg tgc | 480 |
| Lys Ala Ala Cys Leu Cys Val Asp Glu Asp Cys Ala His Val Gly Cys | |
| 145 150 155 160 | |
| cac ccc gcc gtc gcg ttc atg gcg cag gtc ctc ttc gcc gcc tcc acc | 528 |
| His Pro Ala Val Ala Phe Met Ala Gln Val Leu Phe Ala Ala Ser Thr | |
| 165 170 175 | |
| ttc cag gtc gcc gag ctc acc aac ctc ttc cag cgg cgt ctc ctt gat | 576 |
| Phe Gln Val Ala Glu Leu Thr Asn Leu Phe Gln Arg Arg Leu Leu Asp | |
| 180 185 190 | |
| gtc ctt gat aag gtt gaa gta gat aac ctt cta ttg atc tta tct gtt | 624 |
| Val Leu Asp Lys Val Glu Val Asp Asn Leu Leu Leu Ile Leu Ser Val | |
| 195 200 205 | |
| gcc aac tta tgc aac aaa tct tgc atg aaa ctg ctt gaa aga tgc ctt | 672 |
| Ala Asn Leu Cys Asn Lys Ser Cys Met Lys Leu Leu Glu Arg Cys Leu | |
| 210 215 220 | |
| gat atg gta gtc cgg tca aac ctt gac atg att act ctt gag aag tca | 720 |
| Asp Met Val Val Arg Ser Asn Leu Asp Met Ile Thr Leu Glu Lys Ser | |
| 225 230 235 240 | |

| | |
|---|------|
| ttg cct cca gat gtt atc aag cag att att gat gca cgc cta agc ctc | 768 |
| Leu Pro Pro Asp Val Ile Lys Gln Ile Ile Asp Ala Arg Leu Ser Leu | |
| 245 250 255 | |
| gga tta att tca cca gaa aac aag gga ttt cct aac aaa cat gtg agg | 816 |
| Gly Leu Ile Ser Pro Glu Asn Lys Gly Phe Pro Asn Lys His Val Arg | |
| 260 265 270 | |
| agg ata cac aga gcc ctt gac tct gac gat gta gag cta gtc agg atg | 864 |
| Arg Ile His Arg Ala Leu Asp Ser Asp Asp Val Glu Leu Val Arg Met | |
| 275 280 285 | |
| ctg ctc act gaa gga cag aca aat ctt gat gat gcg ttt gca ctg cac | 912 |
| Leu Leu Thr Glu Gly Gln Thr Asn Leu Asp Asp Ala Phe Ala Leu His | |
| 290 295 300 | |
| tac gcc gtc gaa cat tgt gac tcc aaa att aca acc gag ctt ttg gat | 960 |
| Tyr Ala Val Glu His Cys Asp Ser Lys Ile Thr Thr Glu Leu Leu Asp | |
| 305 310 315 320 | |
| ctc gca ctt gca gat gtt aat cat aga aac cca aga ggt tat act gtt | 1008 |
| Leu Ala Leu Ala Asp Val Asn His Arg Asn Pro Arg Gly Tyr Thr Val | |
| 325 330 335 | |
| ctt cac att gct gcg agg cga aga gag cct aaa atc att gtc tcc ctt | 1056 |
| Leu His Ile Ala Ala Arg Arg Arg Glu Pro Lys Ile Ile Val Ser Leu | |
| 340 345 350 | |
| tta acc aag ggg gct cga cca gca gat gtt aca ttc gat ggg aga aaa | 1104 |
| Leu Thr Lys Gly Ala Arg Pro Ala Asp Val Thr Phe Asp Gly Arg Lys | |
| 355 360 365 | |
| gcg gtt caa atc tca aaa aga cta aca aaa caa ggg gat tac ttt ggg | 1152 |
| Ala Val Gln Ile Ser Lys Arg Leu Thr Lys Gln Gly Asp Tyr Phe Gly | |
| 370 375 380 | |
| gtt acc gaa gaa gga aaa cct tct cca aaa gat agg tta tgt att gaa | 1200 |
| Val Thr Glu Glu Gly Lys Pro Ser Pro Lys Asp Arg Leu Cys Ile Glu | |
| 385 390 395 400 | |
| ata ctg gag caa gct gaa aga agg gac cca caa ctc gga gaa gca tca | 1248 |
| Ile Leu Glu Gln Ala Glu Arg Arg Asp Pro Gln Leu Gly Glu Ala Ser | |
| 405 410 415 | |
| gtt tct ctt gca atg gca ggt gag agt cta cga gga agg ttg ctg tat | 1296 |
| Val Ser Leu Ala Met Ala Gly Glu Ser Leu Arg Gly Arg Leu Leu Tyr | |
| 420 425 430 | |
| ctt gaa aac cga gtt gct ttg gca agg att atg ttt ccg atg gag gca | 1344 |
| Leu Glu Asn Arg Val Ala Leu Ala Arg Ile Met Phe Pro Met Glu Ala | |
| 435 440 445 | |
| aga gta gca atg gat att gct caa gtg gat gga act ttg gaa ttt aac | 1392 |
| Arg Val Ala Met Asp Ile Ala Gln Val Asp Gly Thr Leu Glu Phe Asn | |
| 450 455 460 | |
| ctg ggt tct ggt gca aat cca cct cct gaa aga caa cgg aca act gtt | 1440 |
| Leu Gly Ser Gly Ala Asn Pro Pro Pro Glu Arg Gln Arg Thr Thr Val | |
| 465 470 475 480 | |

gat cta aat gaa agt cct ttc ata atg aaa gaa gaa cac tta gct cgg 1488
 Asp Leu Asn Glu Ser Pro Phe Ile Met Lys Glu Glu His Leu Ala Arg
 485 490 495

atg aca gca ctc tcc aaa aca gtg gag ctc ggg aaa cgc ttt ttc ccg 1536
 Met Thr Ala Leu Ser Lys Thr Val Glu Leu Gly Lys Arg Phe Phe Pro
 500 505 510

cga tgt tcg aac gtg ctc gac aag atc atg gat gat gaa act gat ccg 1584
 Arg Cys Ser Asn Val Leu Asp Lys Ile Met Asp Asp Glu Thr Asp Pro
 515 520 525

gtt tcc ctc gga aga gac acg tcc gcg gag aag agg aag agg ttt cat 1632
 Val Ser Leu Gly Arg Asp Thr Ser Ala Glu Lys Arg Lys Arg Phe His
 530 535 540

gac ctg cag gat gtt ctt cag aag gca ttc cac gag gac aag gag gag 1680
 Asp Leu Gln Asp Val Leu Gln Lys Ala Phe His Glu Asp Lys Glu Glu
 545 550 555 560

aat gac agg tcg ggg ctc tcg tcg tcg tcg tca tcg aca tcg atc ggg 1728
 Asn Asp Arg Ser Gly Leu Ser Ser Ser Ser Ser Ser Thr Ser Ile Gly
 565 570 575

gcc att cga cca agg aga tgaacacccat tgctcccaaa tagttgccat 1776
 Ala Ile Arg Pro Arg Arg
 580

attgatagct aactgtcctc ctggagctac tcacctgatg gttgccttct gtcaattgcc 1836

ccccaaatat attctcaatg gtttaggctt gtacagtatt agttcttaca gctattgccc 1896

cgtcaattgt gaaacgcaga agtttcacta gtgcttgtagc tcgaggtgta atacaagtgc 1956

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<211> 582

<212> PRT

<213> Oryza sativa

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 35 40 45

Glu Asp Phe Ala Phe Leu Ala Asp Ala Arg Ile Ala Val Pro Gly Gly
 50 55 60

Gly Gly Gly Gly Gly Asp Leu Arg Val His Arg Cys Val Leu Ser Ala
 65 70 75 80

Arg Ser Pro Phe Leu Arg Gly Val Phe Ala Arg Arg Ala Ala Ala Ala
 85 90 95
 Ala Gly Gly Gly Gly Glu Asp Gly Ser Glu Arg Leu Glu Leu Arg Glu
 100 105 110
 Leu Leu Gly Gly Gly Gly Glu Glu Val Glu Val Gly Tyr Glu Ala Leu
 115 120 125
 Arg Leu Val Leu Asp Tyr Leu Tyr Ser Gly Arg Val Gly Asp Leu Pro
 130 135 140
 Lys Ala Ala Cys Leu Cys Val Asp Glu Asp Cys Ala His Val Gly Cys
 145 150 155 160
 His Pro Ala Val Ala Phe Met Ala Gln Val Leu Phe Ala Ala Ser Thr
 165 170 175
 Phe Gln Val Ala Glu Leu Thr Asn Leu Phe Gln Arg Arg Leu Leu Asp
 180 185 190
 Val Leu Asp Lys Val Glu Val Asp Asn Leu Leu Leu Ile Leu Ser Val
 195 200 205
 Ala Asn Leu Cys Asn Lys Ser Cys Met Lys Leu Leu Glu Arg Cys Leu
 210 215 220
 Asp Met Val Val Arg Ser Asn Leu Asp Met Ile Thr Leu Glu Lys Ser
 225 230 235 240
 Leu Pro Pro Asp Val Ile Lys Gln Ile Ile Asp Ala Arg Leu Ser Leu
 245 250 255
 Gly Leu Ile Ser Pro Glu Asn Lys Gly Phe Pro Asn Lys His Val Arg
 260 265 270
 Arg Ile His Arg Ala Leu Asp Ser Asp Asp Val Glu Leu Val Arg Met
 275 280 285
 Leu Leu Thr Glu Gly Gln Thr Asn Leu Asp Asp Ala Phe Ala Leu His
 290 295 300
 Tyr Ala Val Glu His Cys Asp Ser Lys Ile Thr Thr Glu Leu Leu Asp
 305 310 315 320
 Leu Ala Leu Ala Asp Val Asn His Arg Asn Pro Arg Gly Tyr Thr Val
 325 330 335
 Leu His Ile Ala Ala Arg Arg Arg Glu Pro Lys Ile Ile Val Ser Leu
 340 345 350
 Leu Thr Lys Gly Ala Arg Pro Ala Asp Val Thr Phe Asp Gly Arg Lys
 355 360 365
 Ala Val Gln Ile Ser Lys Arg Leu Thr Lys Gln Gly Asp Tyr Phe Gly
 370 375 380
 Val Thr Glu Glu Gly Lys Pro Ser Pro Lys Asp Arg Leu Cys Ile Glu
 385 390 395 400

Ile Leu Glu Gln Ala Glu Arg Arg Asp Pro Gln Leu Gly Glu Ala Ser
 405 410 415
 Val Ser Leu Ala Met Ala Gly Glu Ser Leu Arg Gly Arg Leu Leu Tyr
 420 425 430
 Leu Glu Asn Arg Val Ala Leu Ala Arg Ile Met Phe Pro Met Glu Ala
 435 440 445
 Arg Val Ala Met Asp Ile Ala Gln Val Asp Gly Thr Leu Glu Phe Asn
 450 455 460
 Leu Gly Ser Gly Ala Asn Pro Pro Pro Glu Arg Gln Arg Thr Thr Val
 465 470 475 480
 Asp Leu Asn Glu Ser Pro Phe Ile Met Lys Glu Glu His Leu Ala Arg
 485 490 495
 Met Thr Ala Leu Ser Lys Thr Val Glu Leu Gly Lys Arg Phe Phe Pro
 500 505 510
 Arg Cys Ser Asn Val Leu Asp Lys Ile Met Asp Asp Glu Thr Asp Pro
 515 520 525
 Val Ser Leu Gly Arg Asp Thr Ser Ala Glu Lys Arg Lys Arg Phe His
 530 535 540
 Asp Leu Gln Asp Val Leu Gln Lys Ala Phe His Glu Asp Lys Glu Glu
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 <213> *Oryza sativa*

<220>
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 <223> NPR1 homologue 2 (NH2) protein that interacts with
 PNI protein

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 Cys Ile Asp Ile Leu Asp Arg Glu Met Ile Arg Lys Pro Met Ala Val
 20 25 30
 gaa gat tct gtc acc tcg cct ttg ttg gct gac gat ctt cac atg aag 144
 Glu Asp Ser Val Thr Ser Pro Leu Leu Ala Asp Asp Leu His Met Lys
 35 40 45

| | |
|--|-----|
| ctt ctc tac ctt gaa aac aga gtt gca ttt gca aga tta ttt ttt cct | 192 |
| Leu Leu Tyr Leu Glu Asn Arg Val Ala Phe Ala Arg Leu Phe Phe Pro | |
| 50 55 60 | |
| gca gaa gca aag gtt gca atg caa att gca caa gca gac acc aca cca | 240 |
| Ala Glu Ala Lys Val Ala Met Gln Ile Ala Gln Ala Asp Thr Thr Pro | |
| 65 70 75 80 | |
| gaa ttt ggc att gtt cct gca gct agc act tct gga aaa ttg aag gaa | 288 |
| Glu Phe Gly Ile Val Pro Ala Ala Ser Thr Ser Gly Lys Leu Lys Glu | |
| 85 90 95 | |
| gtc gat ctg aac gag aca cca gta aca caa aac aaa agg ctc cgt tca | 336 |
| Val Asp Leu Asn Glu Thr Pro Val Thr Gln Asn Lys Arg Leu Arg Ser | |
| 100 105 110 | |
| agg gtg gat gca ctc atg aaa aca gtt gag ctg gga cgt cgc tac ttc | 384 |
| Arg Val Asp Ala Leu Met Lys Thr Val Glu Leu Gly Arg Arg Tyr Phe | |
| 115 120 125 | |
| cct aac tgc tgc cag gtg ctc gac aaa ttt ctg gag gat gat ttg ccc | 432 |
| Pro Asn Cys Ser Gln Val Leu Asp Lys Phe Leu Glu Asp Asp Leu Pro | |
| 130 135 140 | |
| gat agt cct gat gca ctc gac ctc caa aat ggc act tct gat gag caa | 480 |
| Asp Ser Pro Asp Ala Leu Asp Leu Gln Asn Gly Thr Ser Asp Glu Gln | |
| 145 150 155 160 | |
| aat gtt aaa agg atg cgg ttc tgt gag tta aag gag gat gtg cgc aag | 528 |
| Asn Val Lys Arg Met Arg Phe Cys Glu Leu Lys Glu Asp Val Arg Lys | |
| 165 170 175 | |
| gca ttc agc aaa gac aga gct gat aat agc atg ttt tct atc ttg tca | 576 |
| Ala Phe Ser Lys Asp Arg Ala Asp Asn Ser Met Phe Ser Ile Leu Ser | |
| 180 185 190 | |
| tct tca tgc tcc tct tgc cca cct ccc aag gtt gca aag aaa | 618 |
| Ser Ser Ser Ser Ser Ser Pro Pro Pro Lys Val Ala Lys Lys | |
| 195 200 205 | |
| tgacagaagt tttgtaacaa atttccgctc gtgatgttac tgggacaaga gatatcgatc | 678 |
| aatagacctg tatagtctta cagtgggtata acaattagat atcgaagctt cttcgaatat | 738 |
| tagaaagtgc tgttctgggc tgcactcagc tggtttatgg gacccatgcg gtgaaactgg | 798 |
| caaaagaaaa ccagctgatt agaggctcca aagtagtgtc tctcgtgaat atgtttgtag | 858 |
| cattctgttt tgttcaggat ggctgtaatg ataaaatctt ttcaatagat atatagctaa | 918 |
| ttgtctcgta aaaaaaaaaa aaaaaaaaaa a | 949 |

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 20 25 30
 Glu Asp Ser Val Thr Ser Pro Leu Leu Ala Asp Asp Leu His Met Lys
 35 40 45
 Leu Leu Tyr Leu Glu Asn Arg Val Ala Phe Ala Arg Leu Phe Phe Pro
 50 55 60
 Ala Glu Ala Lys Val Ala Met Gln Ile Ala Gln Ala Asp Thr Thr Pro
 65 70 75 80
 Glu Phe Gly Ile Val Pro Ala Ala Ser Thr Ser Gly Lys Leu Lys Glu
 85 90 95
 Val Asp Leu Asn Glu Thr Pro Val Thr Gln Asn Lys Arg Leu Arg Ser
 100 105 110
 Arg Val Asp Ala Leu Met Lys Thr Val Glu Leu Gly Arg Arg Tyr Phe
 115 120 125
 Pro Asn Cys Ser Gln Val Leu Asp Lys Phe Leu Glu Asp Asp Leu Pro
 130 135 140
 Asp Ser Pro Asp Ala Leu Asp Leu Gln Asn Gly Thr Ser Asp Glu Gln
 145 150 155 160
 Asn Val Lys Arg Met Arg Phe Cys Glu Leu Lys Glu Asp Val Arg Lys
 165 170 175
 Ala Phe Ser Lys Asp Arg Ala Asp Asn Ser Met Phe Ser Ile Leu Ser
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 Ser Ser Ser Ser Ser Ser Pro Pro Pro Lys Val Ala Lys Lys
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 protein

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 agt tat cct cca ctt gga tat ggt atc atg tca gta cca ggt gcc tat 96
 Ser Tyr Pro Pro Leu Gly Tyr Gly Ile Met Ser Val Pro Gly Ala Tyr
 20 25 30
 ggt gct gct cct gct agt act gca cag cct atg ctg tat gct cca aga 144
 Gly Ala Ala Pro Ala Ser Thr Ala Gln Pro Met Leu Tyr Ala Pro Arg
 35 40 45

gct cct cca ggg gca gca atg gtt cca atg atg tta ccg gat ggt cat 192
Ala Pro Pro Gly Ala Ala Met Val Pro Met Met Leu Pro Asp Gly His
50 55 60

ctc gta tat gtt gta caa cag cct ggt gga cag ttg ccg ctg gct tcg 240
Leu Val Tyr Val Val Gln Gln Pro Gly Gly Gln Leu Pro Leu Ala Ser
65 70 75 80

ccg ccg ccg cag caa gct gga cat cgt agc ggc agt gga gga cgt cat 288
Pro Pro Pro Gln Gln Ala Gly His Arg Ser Gly Ser Gly Gly Arg His
85 90 95

ggc ggc agt ggc agc cgc tat ggc ggt ggt ggt ggc agc tcc ggc agt 336
Gly Gly Ser Gly Ser Arg Tyr Gly Gly Gly Gly Ser Ser Gly Ser
100 105 110

agc agg ccc ggt gca aaa cgg cag aga gga gat gac aac agc agt agc 384
Ser Arg Pro Gly Ala Lys Arg Gln Arg Gly Asp Asp Asn Ser Ser Ser
115 120 125

cgc cac aaa ggc cgg cgc cgc cgt act gat ctg atc agc ata gct gta 432
Arg His Lys Gly Arg Arg Arg Arg Thr Asp Leu Ile Ser Ile Ala Val
130 135 140

gct acc act tagaagatgt agtgccgtcg cagaaaatta ccagaaaatc 481
Ala Thr Thr
145

tggtagaaat aatttatact gtttgtactc atcgatttat tagaagaatt cgtttctgaa 541

acaagactgt acatgcgtat ttaccagtat tttccaatat cgcagaattg ctgaaaaaaaa 601

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20 25 30

Gly Ala Ala Pro Ala Ser Thr Ala Gln Pro Met Leu Tyr Ala Pro Arg
35 40 45

Ala Pro Pro Gly Ala Ala Met Val Pro Met Met Leu Pro Asp Gly His
50 55 60

Leu Val Tyr Val Val Gln Gln Pro Gly Gly Gln Leu Pro Leu Ala Ser
65 70 75 80

Pro Pro Pro Gln Gln Ala Gly His Arg Ser Gly Ser Gly Gly Arg His
85 90 95

Gly Gly Ser Gly Ser Arg Tyr Gly Gly Gly Gly Gly Ser Ser Gly Ser
100 105 110

Ser Arg Pro Gly Ala Lys Arg Gln Arg Gly Asp Asp Asn Ser Ser Ser
 115 120 125

Arg His Lys Gly Arg Arg Arg Arg Thr Asp Leu Ile Ser Ile Ala Val
 130 135 140

Ala Thr Thr
 145

<210> 9
 <211> 951
 <212> DNA
 <213> Oryza sativa

<220>
 <221> CDS
 <222> (1)..(792)
 <223> PREG-like protein that interacts with PNI protein

<400> 9
 atg gac gcc gcc gcg gca gcg ggc ggc gag atg tcg cgg cag aag gcg 48
 Met Asp Ala Ala Ala Ala Ala Gly Gly Glu Met Ser Arg Gln Lys Ala
 1 5 10 15
 acg gcg tcg gct ccg ccg ccg ccg gag ctg gac atg gtg gcg cgc gcc 96
 Thr Ala Ser Ala Pro Pro Pro Pro Glu Leu Asp Met Val Ala Arg Ala
 20 25 30
 gtg cag cgg ctg gtg gcg cgg aac gac gcg gtg gag gcg ctg agc ggc 144
 Val Gln Arg Leu Val Ala Arg Asn Asp Ala Val Glu Ala Leu Ser Gly
 35 40 45
 gga ggg gag gcg gcg gcg ggg cta gga gca ggg atg gcg gcg ttc gag 192
 Gly Gly Glu Ala Ala Ala Gly Leu Gly Ala Gly Met Ala Ala Phe Glu
 50 55 60
 gcg gcg agg ggc gcg ccg gcg ccg cgc atc ggc gtg gcg cag tat ctg 240
 Ala Ala Arg Gly Ala Pro Ala Pro Arg Ile Gly Val Ala Gln Tyr Leu
 65 70 75 80
 gag cgc gtg cac cgg tac gcc ggg ctg gag ccg gag tgc tac gtg gtg 288
 Glu Arg Val His Arg Tyr Ala Gly Leu Glu Pro Glu Cys Tyr Val Val
 85 90 95
 gcg tac gcg tac gtc gac atg gcg gcg cac cgc cgc ccc gcc gcc gcc 336
 Ala Tyr Ala Tyr Val Asp Met Ala Ala His Arg Arg Pro Ala Ala Ala
 100 105 110
 gtc gcc tcc cgc aac gtc cac cgc ctc ctc ctc gcc tgc ctc ctc gtc 384
 Val Ala Ser Arg Asn Val His Arg Leu Leu Leu Ala Cys Leu Leu Val
 115 120 125
 gcc tcc aag gtt ctc gac gac ttc cac cac aac aac gcg ttc ttc gcg 432
 Ala Ser Lys Val Leu Asp Asp Phe His His Asn Asn Ala Phe Phe Ala
 130 135 140
 cgc gtc ggc ggc gtg agc aac gcg gag atg aac agg ctg gag ctg gag 480
 Arg Val Gly Gly Val Ser Asn Ala Glu Met Asn Arg Leu Glu Leu Glu
 145 150 155 160

ctc ctc gcc gtg ctg gac ttc gag gtc atg ctc agc cac cgc gtc tac 528
 Leu Leu Ala Val Leu Asp Phe Glu Val Met Leu Ser His Arg Val Tyr
 165 170 175
 gag ctc tac cac gag cac ctc aag aag gag gcg cgg agg gac ggc ggc 576
 Glu Leu Tyr His Glu His Leu Lys Lys Glu Ala Arg Arg Asp Gly Gly
 180 185 190
 gcc ggc gac atg ctc gcc ggc gcg tcg gcc gcc gcc gcc gcc aag gcg 624
 Ala Gly Asp Met Leu Ala Gly Ala Ser Ala Ala Ala Ala Ala Lys Ala
 195 200 205
 ggg aga atg gcg gcc gtc tcg ccg tcc aag ctg ctg gaa cgc gcg gcg 672
 Gly Arg Met Ala Ala Val Ser Pro Ser Lys Leu Leu Glu Arg Ala Ala
 210 215 220
 gtg aac ggc gcc gcg cag cac gac gac tgg agg agc ctg ggt acg gcg 720
 Val Asn Gly Ala Ala Gln His Asp Asp Trp Arg Ser Leu Gly Thr Ala
 225 230 235 240
 gcg gcg gcg gag gcg gcg aac ggc gtg cgg cgg cac agg tcg tcg tcg 768
 Ala Ala Ala Glu Ala Ala Asn Gly Val Arg Arg His Arg Ser Ser Ser
 245 250 255
 tcg tcg cgg tat tcc ttc gat tgc tagtatagcc agcgttgcca aagagcgcgt 822
 Ser Ser Arg Tyr Ser Phe Asp Cys
 260
 tctgtgtgta tatatcaggt tatcaacgag agtttttgag gctgtaaaaa aattaaagac 882
 ggattaatta cctgccaaag tgccaattag caaatgtttc ccataaaaaa aaaaaaaaaa 942
 aaaaaaaaaa 951

<210> 10
 <211> 264
 <212> PRT
 <213> *Oryza sativa*

<400> 10
 Met Asp Ala Ala Ala Ala Ala Gly Gly Glu Met Ser Arg Gln Lys Ala 15
 1 5 10
 Thr Ala Ser Ala Pro Pro Pro Pro Glu Leu Asp Met Val Ala Arg Ala 30
 20 25
 Val Gln Arg Leu Val Ala Arg Asn Asp Ala Val Glu Ala Leu Ser Gly 45
 35 40
 Gly Gly Glu Ala Ala Ala Gly Leu Gly Ala Gly Met Ala Ala Phe Glu 60
 50 55
 Ala Ala Arg Gly Ala Pro Ala Pro Arg Ile Gly Val Ala Gln Tyr Leu 80
 65 70 75
 Glu Arg Val His Arg Tyr Ala Gly Leu Glu Pro Glu Cys Tyr Val Val 95
 85 90
 Ala Tyr Ala Tyr Val Asp Met Ala Ala His Arg Arg Pro Ala Ala Ala 110
 100 105

Val Ala Ser Arg Asn Val His Arg Leu Leu Leu Ala Cys Leu Leu Val
 115 120 125
 Ala Ser Lys Val Leu Asp Asp Phe His His Asn Asn Ala Phe Phe Ala
 130 135 140
 Arg Val Gly Gly Val Ser Asn Ala Glu Met Asn Arg Leu Glu Leu Glu
 145 150 155 160
 Leu Leu Ala Val Leu Asp Phe Glu Val Met Leu Ser His Arg Val Tyr
 165 170 175
 Glu Leu Tyr His Glu His Leu Lys Lys Glu Ala Arg Arg Asp Gly Gly
 180 185 190
 Ala Gly Asp Met Leu Ala Gly Ala Ser Ala Ala Ala Ala Lys Ala
 195 200 205
 Gly Arg Met Ala Ala Val Ser Pro Ser Lys Leu Leu Glu Arg Ala Ala
 210 215 220
 Val Asn Gly Ala Ala Gln His Asp Asp Trp Arg Ser Leu Gly Thr Ala
 225 230 235 240
 Ala Ala Ala Glu Ala Ala Asn Gly Val Arg Arg His Arg Ser Ser Ser
 245 250 255
 Ser Ser Arg Tyr Ser Phe Asp Cys
 260

<210> 11
 <211> 621
 <212> DNA
 <213> Oryza sativa

<220>
 <221> CDS
 <222> (1)..(621)
 <223> novel protein that interacts with PNI protein

<400> 11
 agt gct agt gat gaa gcc ctt gca aaa gca gca tct ctg tat gga ggt 48
 Ser Ala Ser Asp Glu Ala Leu Ala Lys Ala Ala Ser Leu Tyr Gly Gly
 1 5 10 15
 gct cta aga aat gtt gag aaa gag tac gaa gaa ttt aat aga att tta 96
 Ala Leu Arg Asn Val Glu Lys Glu Tyr Glu Glu Phe Asn Arg Ile Leu
 20 25 30
 tct tct cag act ata gat cca ttg agg gct atg gct gca ggc gct ccc 144
 Ser Ser Gln Thr Ile Asp Pro Leu Arg Ala Met Ala Ala Gly Ala Pro
 35 40 45
 ctg gaa gat gct cgt ggt ctt gca caa cgt tat agc cgg atg aga cat 192
 Leu Glu Asp Ala Arg Gly Leu Ala Gln Arg Tyr Ser Arg Met Arg His
 50 55 60

| | |
|---|-----|
| gaa gct gag atc ctt tct gct gaa att gct aga agg aag caa cgg gta | 240 |
| Glu Ala Glu Ile Leu Ser Ala Glu Ile Ala Arg Arg Lys Gln Arg Val | |
| 65 70 75 80 | |
| | |
| cga gaa gct cca gtt gct gag cac act acg aag ctt caa cag tct gaa | 288 |
| Arg Glu Ala Pro Val Ala Glu His Thr Thr Lys Leu Gln Gln Ser Glu | |
| 85 90 95 | |
| | |
| tct aaa atg ata gag cac aaa gca agc atg gct gtg tta gga aag gaa | 336 |
| Ser Lys Met Ile Glu His Lys Ala Ser Met Ala Val Leu Gly Lys Glu | |
| 100 105 110 | |
| | |
| gct gct gct gca ctt gcc gct gtt gaa tct cag cag caa agg ata act | 384 |
| Ala Ala Ala Ala Leu Ala Ala Val Glu Ser Gln Gln Gln Arg Ile Thr | |
| 115 120 125 | |
| | |
| ctt cag cgc ctg gtt ggc atg gta gaa gca gaa aag tta ttt cat ttg | 432 |
| Leu Gln Arg Leu Val Gly Met Val Glu Ala Glu Lys Leu Phe His Leu | |
| 130 135 140 | |
| | |
| agg tta gct gct ata ctt gat gat gtt gaa gct gag atg tcc tct gaa | 480 |
| Arg Leu Ala Ala Ile Leu Asp Asp Val Glu Ala Glu Met Ser Ser Glu | |
| 145 150 155 160 | |
| | |
| aag caa aag aga gaa tct gca ccg cct act att cat tct cat aag cgt | 528 |
| Lys Gln Lys Arg Glu Ser Ala Pro Pro Thr Ile His Ser His Lys Arg | |
| 165 170 175 | |
| | |
| gct gag aag gcc cag tac ttc ctt gct gag gcg gtg cat aac ttc aat | 576 |
| Ala Glu Lys Ala Gln Tyr Phe Leu Ala Glu Ala Val His Asn Phe Asn | |
| 180 185 190 | |
| | |
| ggg acc aca gaa aag gag ttg agt tta att gtg gtg att atg tcg | 621 |
| Gly Thr Thr Glu Lys Glu Leu Ser Leu Ile Val Val Ile Met Ser | |
| 195 200 205 | |

<210> 12
 <211> 207
 <212> PRT
 <213> Oryza sativa

| | |
|---|--|
| <400> 12 | |
| Ser Ala Ser Asp Glu Ala Leu Ala Lys Ala Ala Ser Leu Tyr Gly Gly | |
| 1 5 10 15 | |
| | |
| Ala Leu Arg Asn Val Glu Lys Glu Tyr Glu Glu Phe Asn Arg Ile Leu | |
| 20 25 30 | |
| | |
| Ser Ser Gln Thr Ile Asp Pro Leu Arg Ala Met Ala Ala Gly Ala Pro | |
| 35 40 45 | |
| | |
| Leu Glu Asp Ala Arg Gly Leu Ala Gln Arg Tyr Ser Arg Met Arg His | |
| 50 55 60 | |
| | |
| Glu Ala Glu Ile Leu Ser Ala Glu Ile Ala Arg Arg Lys Gln Arg Val | |
| 65 70 75 80 | |
| | |
| Arg Glu Ala Pro Val Ala Glu His Thr Thr Lys Leu Gln Gln Ser Glu | |
| 85 90 95 | |

Ser Lys Met Ile Glu His Lys Ala Ser Met Ala Val Leu Gly Lys Glu
 100 105 110
 Ala Ala Ala Ala Leu Ala Ala Val Glu Ser Gln Gln Gln Arg Ile Thr
 115 120 125
 Leu Gln Arg Leu Val Gly Met Val Glu Ala Glu Lys Leu Phe His Leu
 130 135 140
 Arg Leu Ala Ala Ile Leu Asp Asp Val Glu Ala Glu Met Ser Ser Glu
 145 150 155 160
 Lys Gln Lys Arg Glu Ser Ala Pro Pro Thr Ile His Ser His Lys Arg
 165 170 175
 Ala Glu Lys Ala Gln Tyr Phe Leu Ala Glu Ala Val His Asn Phe Asn
 180 185 190
 Gly Thr Thr Glu Lys Glu Leu Ser Leu Ile Val Val Ile Met Ser
 195 200 205

<210> 13
 <211> 444
 <212> DNA
 <213> Oryza sativa

<220>
 <221> CDS
 <222> (1)..(441)
 <223> GRL1 homologue of glutaredoxin that interacts with
 MN1

<400> 13
 atg tac cag gcg atc ccg tac agc agc acc cgg ccg tgg ctc agg ccg 48
 Met Tyr Gln Ala Ile Pro Tyr Ser Ser Thr Arg Pro Trp Leu Arg Pro
 1 5 10 15
 gag ccg gcg gcg agc gtg gtc gac gtc gtg aag gtg gag acg acg acg 96
 Glu Pro Ala Ala Ser Val Val Asp Val Val Lys Val Glu Thr Thr Thr
 20 25 30
 gcc gtc gcg ggt cgg ggc ggt gag gcg gag gtc gtg ggg gag gag gag 144
 Ala Val Ala Gly Arg Gly Gly Glu Ala Glu Val Val Gly Glu Glu Glu
 35 40 45
 gcg gcg gag gtg cgg agg gcg gtg gcg gag agc ccg gtg ctg gtg gtg 192
 Ala Ala Glu Val Arg Arg Ala Val Ala Glu Ser Pro Val Leu Val Val
 50 55 60
 ggg agg cgc ggg tgc tgc ctc atc cac gtg gtg aag cgg ctg ctg cag 240
 Gly Arg Arg Gly Cys Leu Ile His Val Val Lys Arg Leu Leu Gln
 65 70 75 80
 ggg ctc ggg gtc aac ccg gcc gtg cac gag gtc gcc ggc gag gcc gcg 288
 Gly Leu Gly Val Asn Pro Ala Val His Glu Val Ala Gly Glu Ala Ala
 85 90 95

ctc aag ggg gtt gtg ccg gcc ggt ggg gag gcc gcg gcg ctc ccc gcc 336
 Leu Lys Gly Val Val Pro Ala Gly Gly Glu Ala Ala Ala Leu Pro Ala
 100 105 110

gtg ttc gtc ggg ggg aag ctc ctc ggc ggg ctc gac cgc ctc atg gcc 384
 Val Phe Val Gly Gly Lys Leu Leu Gly Gly Leu Asp Arg Leu Met Ala
 115 120 125

gtc cac atc tcc ggc gag ctc gtg ccc atc ctc aag aag gcc ggt gcc 432
 Val His Ile Ser Gly Glu Leu Val Pro Ile Leu Lys Lys Ala Gly Ala
 130 135 140

ctc tgg ctt taa 444
 Leu Trp Leu
 145

<210> 14
 <211> 147
 <212> PRT
 <213> Oryza sativa

<400> 14
 Met Tyr Gln Ala Ile Pro Tyr Ser Ser Thr Arg Pro Trp Leu Arg Pro
 1 5 10 15

Glu Pro Ala Ala Ser Val Val Asp Val Val Lys Val Glu Thr Thr Thr
 20 25 30

Ala Val Ala Gly Arg Gly Gly Glu Ala Glu Val Val Gly Glu Glu Glu
 35 40 45

Ala Ala Glu Val Arg Arg Ala Val Ala Glu Ser Pro Val Leu Val Val
 50 55 60

Gly Arg Arg Gly Cys Cys Leu Ile His Val Val Lys Arg Leu Leu Gln
 65 70 75 80

Gly Leu Gly Val Asn Pro Ala Val His Glu Val Ala Gly Glu Ala Ala
 85 90 95

Leu Lys Gly Val Val Pro Ala Gly Gly Glu Ala Ala Ala Leu Pro Ala
 100 105 110

Val Phe Val Gly Gly Lys Leu Leu Gly Gly Leu Asp Arg Leu Met Ala
 115 120 125

Val His Ile Ser Gly Glu Leu Val Pro Ile Leu Lys Lys Ala Gly Ala
 130 135 140

Leu Trp Leu
 145

<210> 15
 <211> 393
 <212> DNA
 <213> Oryza sativa

<220>
 <221> CDS
 <222> (1)..(390)
 <223> GRL2 homologue of glutaredoxin that interacts with
 MN1

<400> 15
 atg tac cag gcg atc ccg tac aac gcg aac cgg gct tgg ccg gcg gcg 48
 Met Tyr Gln Ala Ile Pro Tyr Asn Ala Asn Arg Ala Trp Pro Ala Ala
 1 5 10 15
 agc cgg ccg gcg acg gcg ccg ccg ccg ccg ccg ccg ccg cgt gga gag 96
 Ser Arg Pro Ala Thr Ala Pro Pro Pro Pro Pro Pro Arg Gly Glu
 20 25 30
 gag gag gag gtg agg agg gcg gtg gcg gag tgc ccg gtg gtg gtg gtg 144
 Glu Glu Glu Val Arg Arg Ala Val Ala Glu Cys Pro Val Val Val Val
 35 40 45
 ggt cgg agc ggg tgc tgc ctg agc cac gtc gtg aag cgg ctg ctg cag 192
 Gly Arg Ser Gly Cys Cys Leu Ser His Val Val Lys Arg Leu Leu Gln
 50 55 60
 ggg ctc ggg gtc aac ccg gcg gtg cac gag gtc gcc ggc gag gcc gag 240
 Gly Leu Gly Val Asn Pro Ala Val His Glu Val Ala Gly Glu Ala Glu
 65 70 75 80
 ctc gcc ggg gtg gtc gcc ggc ggc ggc ggc gtc gcg ctg ccg gcg gtg 288
 Leu Ala Gly Val Val Ala Gly Gly Gly Gly Val Ala Leu Pro Ala Val
 85 90 95
 ttc gtc ggc ggg agg ctc ctc ggc ggg ctc gac cgg ctc atg gcc gtg 336
 Phe Val Gly Gly Arg Leu Leu Gly Gly Leu Asp Arg Leu Met Ala Val
 100 105 110
 cac atc tcc ggc gag ctc gtg ccc att ctg aag gag gcc ggt gca ctc 384
 His Ile Ser Gly Glu Leu Val Pro Ile Leu Lys Glu Ala Gly Ala Leu
 115 120 125
 tgg ctc tga 393
 Trp Leu
 130

<210> 16
 <211> 130
 <212> PRT
 <213> Oryza sativa

<400> 16
 Met Tyr Gln Ala Ile Pro Tyr Asn Ala Asn Arg Ala Trp Pro Ala Ala
 1 5 10 15
 Ser Arg Pro Ala Thr Ala Pro Pro Pro Pro Pro Pro Pro Arg Gly Glu
 20 25 30
 Glu Glu Glu Val Arg Arg Ala Val Ala Glu Cys Pro Val Val Val Val
 35 40 45
 Gly Arg Ser Gly Cys Cys Leu Ser His Val Val Lys Arg Leu Leu Gln
 50 55 60

Gly Leu Gly Val Asn Pro Ala Val His Glu Val Ala Gly Glu Ala Glu
 65 70 75 80
 Leu Ala Gly Val Val Ala Gly Gly Gly Gly Val Ala Leu Pro Ala Val
 85 90 95
 Phe Val Gly Gly Arg Leu Leu Gly Gly Leu Asp Arg Leu Met Ala Val
 100 105 110
 His Ile Ser Gly Glu Leu Val Pro Ile Leu Lys Glu Ala Gly Ala Leu
 115 120 125
 Trp Leu
 130

<210> 17
 <211> 651
 <212> DNA
 <213> Oryza sativa

<220>
 <221> CDS
 <222> (1)..(651)
 <223> protein homologue to rat microtubule-associated
 protein 1A (MAP1A) that interacts with MN1

<400> 17
 atg ggc tcg tcg gcg gcc gac tcg ttc ccc gcc ggt gga gat gat gca 48
 Met Gly Ser Ser Ala Ala Asp Ser Phe Pro Ala Gly Gly Asp Asp Ala
 1 5 10 15
 atc cga gac gtg tac ggc atc ggt ggt ggt ggg gag gag gac gat ccg 96
 Ile Arg Asp Val Tyr Gly Ile Gly Gly Gly Gly Glu Glu Asp Asp Pro
 20 25 30
 tcc ctc ttc ctc tac ctc tcc gac ctc gcc ccc gtc tcc ccc tcc gcc 144
 Ser Leu Phe Leu Tyr Leu Ser Asp Leu Ala Pro Val Ser Pro Ser Ala
 35 40 45
 tac ctc gac ctc ccc ccc tcg ccg ccg ccg ccg acg acg acg gct acg 192
 Tyr Leu Asp Leu Pro Pro Ser Pro Pro Pro Pro Thr Thr Thr Ala Thr
 50 55 60
 acg atg gtg aag gag ggg gag gag gcg ccg gag gac ctg gtg ctg ccg 240
 Thr Met Val Lys Glu Gly Glu Glu Ala Pro Glu Asp Leu Val Leu Pro
 65 70 75 80
 ttc atc tcg agg atg ctg atc gag gag gac atc gac gac aag ttc ttc 288
 Phe Ile Ser Arg Met Leu Ile Glu Glu Asp Ile Asp Asp Lys Phe Phe
 85 90 95
 tac gac tac ccc gac aac ccg gcg ctg ctc cag gcg cag cag ccc ttc 336
 Tyr Asp Tyr Pro Asp Asn Pro Ala Leu Leu Gln Ala Gln Gln Pro Phe
 100 105 110
 ctc gag atc ctc tcc gat ccc tcc tcc aac tcc cgc tcc tcc aac tcc 384
 Leu Glu Ile Leu Ser Asp Pro Ser Ser Asn Ser Arg Ser Ser Asn Ser
 115 120 125

| | |
|---|-----|
| gac gac ccc cgc ctc tcc ccg acc tcc tcc tcc gac acc tcc gcc gcc | 432 |
| Asp Asp Pro Arg Leu Ser Pro Thr Ser Ser Ser Asp Thr Ser Ala Ala | |
| 130 135 140 | |
| | |
| atc aac tcc tac gac gcc gcc gcc acc gcc acc gcc gtt gcc gcc gcc | 480 |
| Ile Asn Ser Tyr Asp Ala Ala Ala Thr Ala Thr Ala Val Ala Ala Ala | |
| 145 150 155 160 | |
| | |
| gcg gtg ccc gtg ccg cag tac gag agc atc gag ctc gat ccc gcc gcg | 528 |
| Ala Val Pro Val Pro Gln Tyr Glu Ser Ile Glu Leu Asp Pro Ala Ala | |
| 165 170 175 | |
| | |
| ttc ttc gcc gcg gcc aac tcc gac ctc atg agc tcc gct tct caa ggg | 576 |
| Phe Phe Ala Ala Ala Asn Ser Asp Leu Met Ser Ser Ala Ser Gln Gly | |
| 180 185 190 | |
| | |
| gat gga gga ggc gaa caa gtt cct ccc acc gag aac aag ctc gtc atc | 624 |
| Asp Gly Gly Gly Glu Gln Val Pro Pro Thr Glu Asn Lys Leu Val Ile | |
| 195 200 205 | |
| | |
| gac ctc gag gcc tcg tcg gag aat aat | 651 |
| Asp Leu Glu Ala Ser Ser Glu Asn Asn | |
| 210 215 | |

<210> 18
 <211> 217
 <212> PRT
 <213> Oryza sativa

<400> 18
 Met Gly Ser Ser Ala Ala Asp Ser Phe Pro Ala Gly Gly Asp Asp Ala
 1 5 10 15
 Ile Arg Asp Val Tyr Gly Ile Gly Gly Gly Glu Glu Asp Asp Pro
 20 25 30
 Ser Leu Phe Leu Tyr Leu Ser Asp Leu Ala Pro Val Ser Pro Ser Ala
 35 40 45
 Tyr Leu Asp Leu Pro Pro Ser Pro Pro Pro Thr Thr Thr Ala Thr
 50 55 60
 Thr Met Val Lys Glu Gly Glu Glu Ala Pro Glu Asp Leu Val Leu Pro
 65 70 75 80
 Phe Ile Ser Arg Met Leu Ile Glu Glu Asp Ile Asp Asp Lys Phe Phe
 85 90 95
 Tyr Asp Tyr Pro Asp Asn Pro Ala Leu Leu Gln Ala Gln Gln Pro Phe
 100 105 110
 Leu Glu Ile Leu Ser Asp Pro Ser Ser Asn Ser Arg Ser Ser Asn Ser
 115 120 125
 Asp Asp Pro Arg Leu Ser Pro Thr Ser Ser Ser Asp Thr Ser Ala Ala
 130 135 140
 Ile Asn Ser Tyr Asp Ala Ala Ala Thr Ala Thr Ala Val Ala Ala Ala
 145 150 155 160

Ala Val Pro Val Pro Gln Tyr Glu Ser Ile Glu Leu Asp Pro Ala Ala
165 170 175

Phe Phe Ala Ala Ala Asn Ser Asp Leu Met Ser Ser Ala Ser Gln Gly
180 185 190

Asp Gly Gly Gly Glu Gln Val Pro Pro Thr Glu Asn Lys Leu Val Ile
195 200 205

Asp Leu Glu Ala Ser Ser Glu Asn Asn
210 215

<210> 19
<211> 1005
<212> DNA
<213> Oryza sativa

<220>
<223> rice bZIP protein MN1 cDNA

<220>
<221> CDS
<222> (1)..(1002)

<400> 19
atg gca gat gct agt tca agg act gac aca tcg att gtt gta gac aac 48
Met Ala Asp Ala Ser Ser Arg Thr Asp Thr Ser Ile Val Val Asp Asn
1 5 10 15

gac gac aaa aac cac cag tta gaa aac gga cat agt ggt gca gtc atg 96
Asp Asp Lys Asn His Gln Leu Glu Asn Gly His Ser Gly Ala Val Met
20 25 30

gct tct aac tct tca gat aga tct gac aga tct gac aaa ctt atg gac 144
Ala Ser Asn Ser Ser Asp Arg Ser Asp Arg Ser Asp Lys Leu Met Asp
35 40 45

caa aag aca atg cgg cgg ctt gct caa aat cgt gag gca gca aga aaa 192
Gln Lys Thr Met Arg Arg Leu Ala Gln Asn Arg Glu Ala Ala Arg Lys
50 55 60

agt cgg ctg agg aaa aag gca tat gtg caa caa cta gag agc agt aag 240
Ser Arg Leu Arg Lys Lys Ala Tyr Val Gln Gln Leu Glu Ser Ser Lys
65 70 75 80

ctg aag ctt gca cag cta gag cag gaa ctt cag aaa gct cgt cag cag 288
Leu Lys Leu Ala Gln Leu Glu Gln Glu Leu Gln Lys Ala Arg Gln Gln
85 90 95

gga atc ttc atc tct agc tct gga gac cag acc cat gcc atg agt gga 336
Gly Ile Phe Ile Ser Ser Ser Gly Asp Gln Thr His Ala Met Ser Gly
100 105 110

aat ggg gca ttg act ttt gac tta gaa tac act aga tgg ctc gag gag 384
Asn Gly Ala Leu Thr Phe Asp Leu Glu Tyr Thr Arg Trp Leu Glu Glu
115 120 125

| | |
|---|------|
| caa aat aag cag ata aat gag ttg agg aca gca gtg aat gct cat gca | 432 |
| Gln Asn Lys Gln Ile Asn Glu Leu Arg Thr Ala Val Asn Ala His Ala | |
| 130 135 140 | |
| agt gac agt gac ctt cgt ctt att gtt gat ggc ata atg gcg cat tat | 480 |
| Ser Asp Ser Asp Leu Arg Leu Ile Val Asp Gly Ile Met Ala His Tyr | |
| 145 150 155 160 | |
| gac gag gta ttc aag gtt aag ggt gta gct gca aag gcc gat gtg ttt | 528 |
| Asp Glu Val Phe Lys Val Lys Gly Val Ala Ala Lys Ala Asp Val Phe | |
| 165 170 175 | |
| cat ata ctt tca ggc atg tgg aag aca ccc gca gaa aga tgc ttc ctg | 576 |
| His Ile Leu Ser Gly Met Trp Lys Thr Pro Ala Glu Arg Cys Phe Leu | |
| 180 185 190 | |
| tgg ctt ggt ggt ttc cgt cca tct gag ctt cta aag ctc cta gca aat | 624 |
| Trp Leu Gly Gly Phe Arg Pro Ser Glu Leu Leu Lys Leu Leu Ala Asn | |
| 195 200 205 | |
| cac ctc gaa cct tta acc gag cag cag ttg ctg gga tta aac aac ctc | 672 |
| His Leu Glu Pro Leu Thr Glu Gln Gln Leu Leu Gly Leu Asn Asn Leu | |
| 210 215 220 | |
| cag gaa tct tct cag cag gcg gag gat gca ctt tca caa ggt atg gaa | 720 |
| Gln Glu Ser Ser Gln Gln Ala Glu Asp Ala Leu Ser Gln Gly Met Glu | |
| 225 230 235 240 | |
| gca ctg cag caa tct ctg gca gat act ttg gct gga tct ctc gct tca | 768 |
| Ala Leu Gln Gln Ser Leu Ala Asp Thr Leu Ala Gly Ser Leu Ala Ser | |
| 245 250 255 | |
| tca ggg tct tct ggg aat gtg gcg aac tac atg ggt cag atg gca atg | 816 |
| Ser Gly Ser Ser Gly Asn Val Ala Asn Tyr Met Gly Gln Met Ala Met | |
| 260 265 270 | |
| gcc atg ggt aaa cta gga acg ctc gag aat ttc ctt tgc cag gcg gac | 864 |
| Ala Met Gly Lys Leu Gly Thr Leu Glu Asn Phe Leu Cys Gln Ala Asp | |
| 275 280 285 | |
| aac ctg cga cag cag aca ttg cat caa atg caa cga att ctg acg atc | 912 |
| Asn Leu Arg Gln Gln Thr Leu His Gln Met Gln Arg Ile Leu Thr Ile | |
| 290 295 300 | |
| cgg caa gcc tcg cgt gct ctt ctt gcc ata cac gat tac ttt tca cgc | 960 |
| Arg Gln Ala Ser Arg Ala Leu Leu Ala Ile His Asp Tyr Phe Ser Arg | |
| 305 310 315 320 | |
| ttg cgt gct ttg agt tcg ctg tgg ctt gct agg cca cgg gag taa | 1005 |
| Leu Arg Ala Leu Ser Ser Leu Trp Leu Ala Arg Pro Arg Glu | |
| 325 330 | |

<210> 20
 <211> 334
 <212> PRT
 <213> Oryza sativa
 <223> rice bZIP protein MN1 cDNA

<400> 20

Met Ala Asp Ala Ser Ser Arg Thr Asp Thr Ser Ile Val Val Asp Asn
1 5 10 15
Asp Asp Lys Asn His Gln Leu Glu Asn Gly His Ser Gly Ala Val Met
20 25 30
Ala Ser Asn Ser Ser Asp Arg Ser Asp Arg Ser Asp Lys Leu Met Asp
35 40 45
Gln Lys Thr Met Arg Arg Leu Ala Gln Asn Arg Glu Ala Ala Arg Lys
50 55 60
Ser Arg Leu Arg Lys Lys Ala Tyr Val Gln Gln Leu Glu Ser Ser Lys
65 70 75 80
Leu Lys Leu Ala Gln Leu Glu Gln Glu Leu Gln Lys Ala Arg Gln Gln
85 90 95
Gly Ile Phe Ile Ser Ser Ser Gly Asp Gln Thr His Ala Met Ser Gly
100 105 110
Asn Gly Ala Leu Thr Phe Asp Leu Glu Tyr Thr Arg Trp Leu Glu Glu
115 120 125
Gln Asn Lys Gln Ile Asn Glu Leu Arg Thr Ala Val Asn Ala His Ala
130 135 140
Ser Asp Ser Asp Leu Arg Leu Ile Val Asp Gly Ile Met Ala His Tyr
145 150 155 160
Asp Glu Val Phe Lys Val Lys Gly Val Ala Ala Lys Ala Asp Val Phe
165 170 175
His Ile Leu Ser Gly Met Trp Lys Thr Pro Ala Glu Arg Cys Phe Leu
180 185 190
Trp Leu Gly Gly Phe Arg Pro Ser Glu Leu Leu Lys Leu Leu Ala Asn
195 200 205
His Leu Glu Pro Leu Thr Glu Gln Gln Leu Leu Gly Leu Asn Asn Leu
210 215 220
Gln Glu Ser Ser Gln Gln Ala Glu Asp Ala Leu Ser Gln Gly Met Glu
225 230 235 240
Ala Leu Gln Gln Ser Leu Ala Asp Thr Leu Ala Gly Ser Leu Ala Ser
245 250 255
Ser Gly Ser Ser Gly Asn Val Ala Asn Tyr Met Gly Gln Met Ala Met
260 265 270
Ala Met Gly Lys Leu Gly Thr Leu Glu Asn Phe Leu Cys Gln Ala Asp
275 280 285
Asn Leu Arg Gln Gln Thr Leu His Gln Met Gln Arg Ile Leu Thr Ile
290 295 300
Arg Gln Ala Ser Arg Ala Leu Leu Ala Ile His Asp Tyr Phe Ser Arg
305 310 315 320

Leu Arg Ala Leu Ser Ser Leu Trp Leu Ala Arg Pro Arg Glu
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